

## REMARKS

Claims 1, 10-14, 17-18 and 29-34 are pending in the application.

Claims 15-16, 19-23, 25, 27 and 28 remain withdrawn from consideration.

Claim 33 is amended to overcome the examiner's Section 112 rejection.

New claim 34 has been added to the application.

No new matter is added to the application by these claim amendments.

### I. THE SECTION 112, 2<sup>nd</sup> PARAGRAPH REJECTION OF CLAIM 33

The examiner rejected claim 33 under the second paragraph of Section 112 for being indefinite because the meaning of the claim term "provide the liner with tuned characteristics" is unknown.

The examiner's rejection is overcome by amending claim 33 to clarify that it is the non-uniform distribution of metal filler in the matrix that imparts the tuned characteristics. The term "tuned" or "tune" is discussed in detail in the specification and is not indefinite. The following are some excerpts taken from the specification where liner tuning or tuned characteristics are discussed.

Although not apparent from the figure, it is possible during the formation of the lining 21, to vary the distribution of the filler material or materials over the extent of the liner 21. Such a variation in the loading permits the speed of sound within the liner 21 to be varied and thus allow the liner collapse mechanism to be tuned to suit a particular application. For example, in an unconsolidated formation, there is less need to form a so-called deep hole perforation. Rather there is a need to form a so-called big-hole perforation in the casing. The filler material may therefore be graded over the extent of the liner. Conversely, in a more consolidated formation, the creation of a deep hole perforation results in another graded distribution of filler material. (Page 9, lines 25-33).

Although not shown in FIG. 4, it is possible during the formation of the case 19', to vary the distribution of the filler material or materials over the extent of the case. Such a variation in the loading permits the speed of sound within the case 19' to be varied and thus allow the case fragmentation mechanism to be tuned to suit a particular application. (Page 11, lines 19-22).

Finally, in a single operation moulding process where both case 19' and liner 21 are formed together, it has been found effective to utilise dissolvable cores during the moulding process. Thus, it is possible to mould a waveshaper and initiation unit substantially contemporaneously with the case 19' and liner 21. Furthermore, by incorporating multiple injection ports into the tooling, it is possible to provide

the grading of loading and indeed deliver different loadings into the case 19' and/or liner 21. Thus, it is possible to tune both the penetration characteristics of the liner and the frangibility characteristics of the case 19' independently within a component formed during a single operation. (Page 12, lines 17-25).

The specification excerpts above and the specification as a whole disclose to one skilled in the art that the variation of certain liner properties such as the distribution of filler material allows for the manufacture of shaped charges having properties such as the speed of sound in the case that are tailored to “tune a liner so [as] to suit a particular formation and the nature of the desired perforation.” (Page 3, lines 19-20) For at least this reason, claim 33 as presently drafted is believed to satisfy the requirements of Section 112, 2<sup>nd</sup> paragraph.

## **II. THE ANTICIPATION REJECTION**

The examiner maintained the rejection of claims 1, 29-30, 32 and newly added claim 33 for being anticipated by Collins et al. (USP 6,371,219) (hereinafter Collins). Collins relates to forming a shaped charge liner component from a metal loaded matrix material. The present invention is an improvement over Collins in that it further teaches that the composition of the component may be varied/graded so as to best “tailor” the properties – such as the speed of sound - of the shaped charge. In particular, independent claims 1 and 33 require the liner to include “a first portion and a second portion, the first and second portions comprising different ratios of filler to matrix”. Collins does not disclose this claim features nor is this claim feature inherent in Collins as the examiner alleges.

### **A. The Examiner Continues To Rely Upon A Flawed Claim Construction**

The Applicant previously asserted that the examiner did not give the terms of claim 1 (and now claim 33) a reasonable construction. The examiner has responded by alleging that he has properly given the claims their “broadest reasonable interpretation”. However the examiner’s claim interpretation remains overly broad because it ignores and would erase a meaningful alternative embodiment from the application specification.

The Federal Circuit's *en banc* decision in *Phillips v. AWH Corp.*, 415 F.3d 1303, 75 USPQ2d 1321 (Fed. Cir. 2005) expressly recognized that the USPTO employs the "broadest reasonable interpretation" standard: The Patent and Trademark Office ("PTO") determines the scope of claims in patent applications not solely on the basis of the claim language, but upon

giving claims their broadest reasonable construction "in light of the specification as it would be interpreted by one of ordinary skill in the art."

The specification discloses at least two embodiments of liner filler distributions: (1) homogeneous; and (2) non-uniform distribution. Specifically, the application states:

**Preferably, the non-explosive filler is distributed homogeneously throughout the matrix. However, a non-uniform distribution of filler may be employed where this brings about a particular effect in terms of size of hole and/or depth of penetration. Such tuning of the characteristics is achieved relatively straightforwardly through controlling the introduction of the filler during manufacture of the liner. In use, it may be found effective to tune a liner so as to suit a particular formation and the nature of the desired perforation.**

(See specification at page 3, lines 15-20). The distribution of the filler in the matrix is alternatively described as being "graded" (See, e.g., specification at page 9, lines 25-33) or as having "different ratios" of filler to matrix. (See, e.g., specification at page 5, lines 3-4). In addition, the non-uniform distribution, grading or different ratios are achieved by taking affirmative steps to "tune" the liner characteristics. Examples of such affirmative steps are disclosed in the specification at, for example, page 11, line 28 to page 12, line 25.

With respect to claim 1, the examiner alleges that Collins inherently discloses a polymer matrix that does not comprise a "precise/exact" uniform distribution of the metal to polymer matrix because "some small portion of the Collins et al. liner comprises a somewhat different ratio of metallic filler to polymer matrix than other portions of the Collins et al. liner. What Collins fairly discloses, however, is a homogeneous metal loaded polymer matrix. Collins et al. expressly discloses that "the term 'matrix' means a material is dispersed, and the term 'loaded' means contained within." (See, Collins at col. 2, lines 58-61). Collins concludes that "the liner 28 molding includes a polymer material in which metal is dispersed". *Id.* Based upon reading Collins in its entirety and in particular the passage cited above, one skilled in the art at the time of the invention would understand Collins et al. to disclose a homogeneous polymer/metal matrix.

The examiner's allegation, that Collins' homogeneous polymer/metal matrix inherently reads on applicant's claimed "different ratios" of filler to matrix would have the effect of eliminating homogeneous metal/matrix distributions as embodiments in the prior art or in

Applicant's specification because it appears to be the examiner's position that a homogeneous distribution is impossible.

The sensible and required approach here is to give the prior art homogenous distributions and to give both of Applicant's embodiments – homogeneous distributions and non-uniform distributions - different meanings. An important aspect of the present invention is that the claimed different ratios of the metals impart the liner with “tuned” properties. Even if one were to assume that the homogeneous Collins matrix does not have a precise/exact uniform distribution – that makes no difference because even inherently, Collins does not disclose a mixture with different ratios of filler to matrix that would result in tuned properties. This is at least because no affirmative steps are disclosed in Collins that were intended to manipulate the matrix to cause it to have a non-uniform metal filler distribution. Thus one skilled in the art would understand that Collins, even with a “somewhat different” ratio of metallic filler to polymer matrix as the examiner alleges would still disclose a homogeneous filler/matrix embodiment because properties of the matrix material – such as the speed of sound – remain the same throughout the material as would be the case with a homogeneous material.

The invention of claim 1 discloses first and second portions that include different ratios of filler to matrix materials. One of skill in the art at the time of the invention would understand, from reading the specification as a whole, that the different ratios are achieved by some affirmative manipulation of the matrix/metal mixture such as injecting different ratio materials in different injection ports during article fabrication or creating a grading by giving the filler time to settle from the mixture using gravity. The end result of the filler manipulation is an article having different technical properties in the two manipulated portions. The present specification teaches how these differences allow the characteristics of the liner to be “tuned” (*Cf* page 3, lines 17 to 20 and page 5, lines 16 to 19) for example, to achieve a desired perforation.

As previously noted, the examiner is taking an extreme view that if you examine Collins at a microscale - at a sufficiently high magnification - you will inevitably find different portions of a tiny size with different filler ratios. However, that construction of claim 1 is unreasonable based upon reading Collins and/or the specification as a whole which clearly and unequivocally discusses the differing ratio portions as macroscale features. Hence, the examiner's broadening of the claim 1 “portions” to cover alleged microscale imperfections in homogeneity is inconsistent with how one of skill in the art would understand the terms after reading the

specification as a whole even after giving the terms a broad “reasonable” interpretation. For at least this reason, all pending claims are believed to be novel over Collins.

**B. A Liner Having Different Filler Matrix Ratios Is Not Inherent In Collins**

The examiner alleges that the first and second portions of independent claim 1 are found inherently in Collins. The examiner’s anticipation rejection is further without merit because the inherency allegation is both factually and legally flawed. The present application claims and teaches in the specification to vary the distribution of the filler material or materials over the extent of the liner (page 9 line 26) or the case (page 11 line 20). Indeed, Applicant's invention is best summarised on page 9, line 25 to line 33 of the PCT specification, where it describes that "Such a variation in the loading permits the “speed of sound” within the liner 21 to be varied and thus allow the liner collapse mechanism to be tuned to suit a particular application.". See also page 11 lines 19 to 22 and page 12 lines 17 to 25 where, in particular, it teaches that “it is possible to tune both the penetration characteristics and the frangibility characteristics independently” within a component that is formed during a single operation. Hence Applicant achieves improved control over the physical characteristics of the component as compared with Collins, and hence, improved technical performance.

In order for a prior art reference to have an inherent feature or step, a structure or step in the prior art must necessarily function in accordance with the anticipated claim feature. *In re King*, 231 USPQ 136, 138 (Fed. Cir. 1986). The examiner’s inherency rejection is technically flawed because it cannot be demonstrate that every method that exists for manufacturing the matrix recited in Collins will inherently result in the claimed invention. First off, Collins does not provide any teaching whatsoever that the composition of any filler component may be varied across its dimensions. Indeed, all that Collins discloses is a metal (e.g. in the form of a powder) that is dispersed in a polymer matrix. (Collins at col. 2, lines 58-61). Collins further includes absolutely no teaching about how the “dispersion” is accomplished. Thus, any method known to one skilled in the art for producing such a matrix could be used. It would not take the skilled person long to identify a matrix preparation procedure that could create a homogeneous matrix on a macroscale. For example, a matrix might be prepared from a homogeneous metal containing polymer material or the matrix might be formed from an aqueous mixture of a polymer and metal solution that is allowed to dry. In other words, it is the Applicant’s position

that it is impossible for the examiner to show that all possible methods for producing metal distributed in a polymer matrix would inherently result in the Applicant's invention.

The deviation from logic that results in the examiner's inherency rejection belies another flaw in the examiner's inherency position – that is that one skilled in the art would understand that the Collins matrix is a homogeneous matrix. In order to provide a factually supported inherency position, the examiner must demonstrate that the inherent feature would be recognized by persons of skill in the art. See MPEP §2112 (IV). As has been demonstrated above, one skilled in the art would not understand Collins to disclose (inherently or expressly) the same first and second portions that are described in the specification and that are claimed in claim 1. For each of these reasons, the examiner's inherency position fails and the novelty rejection of claims 1, 29-30 and 32 must be withdrawn.

### **C. Claim 33 Is Novel Over Collins**

Claim 33 is amended above to direct it to a liner that (1) “includes a non-uniform distribution of the at least one non-explosive filler”; and (2) the “non-uniform distribution of filler in the matrix imparts the liner with tuned characteristics”. Each of these claim features alone causes claim 33 to be novel and patentable over Collins.

As noted above the specification expressly discloses at least two invention embodiments. A first embodiment in which matrix and metal are “homogeneous” and a second embodiment in which the liner made from the matrix/metal filler combination includes a “non-uniform” distribution of the at least one non-explosive filler. Also as noted above, the examiner is interpreting Collins to essentially eliminate the applicant's homogenous embodiment from the specification. Moreover, if the Applicant were to present claims directed to the homogeneous embodiment, it is possible that the examiner would take the position that Collins discloses a homogenous liner material – even though there might be macro scale differences in the matrix/filler ration. Clearly, the examiner has interpreted the claimed “different ratios” feature in a manner contrary to common sense and contrary to how one of skill in the art at time of the invention would understand the term. In the end, Collins does not disclose a liner that includes a non-uniform distribution of the at least one non-explosive filler. For at this reason, claim 33 is novel and patentable over the cited prior art.

In addition, claim 33 includes the feature whereby the non-uniform distribution imparts the liner with tuned characteristics. This claim feature is not disclosed or suggested by Collins

as least because any alleged micro differences in filler distribution in Collins would not alter the liner properties in comparison to liners without the micro differences in distribution. As a result, pursuant to the examiner's interpretation, the Collins liners do not contain filler distribution differences that are significant enough and/or that are intentionally imparted in the liner so as to change the liner performance characteristics. Collins, therefore, does not anticipate claim 33 for this reason as well.

### **III. THE OBVIOUSNESS REJECTIONS**

The examiner rejected claims 10-13, 17-18 and 31 for being obvious over Collins.

Claims 10-13, 17-18 and 31 are patentable at least by virtue of their dependence upon independent claim 1 which is patentable for at least the reasons recited in Section II above.

In addition, the examiner has not made out a *prima facie* case of obviousness because the rejection is legally flawed. In particular, the examiner's inherency position with respect to Collins does not legally carry over to the obviousness rejections. That is because inherency and obviousness are distinct concepts. *In re Spormann*, 363 F.2d 444, 448, 150 USPQ 449, 452 (CCPA 1966). In order to establish inherency in an obviousness rejection, the examiner must establish that the alleged inherent feature would have been obvious to those skilled in the art at the time of the invention was made. *Kloster Speedsteel, AB v. Crucible, Inc.*, 793 F.2d 1565, 1576 (Fed. Cir.1986). The examiner has not attempted to demonstrate in the Final Rejection that it would be obvious to one skilled in the art at the time of the invention that Collins discloses something other than an article with a homogenous matrix/filler distribution. Without such a showing the examiner's obviousness rejections cannot be sustained and must be withdrawn.

### **IV. NEW CLAIM 34 IS PATENTABLE**

Claim 34 is newly added to the application. Claim 34 is directed to a liner in which of the distribution of the filler material is varied throughout the liner such as the "filler material is graded over the extent of the liner". This claim feature finds support in the specification at least at page 9, lines 25-33.

There are two important aspects to this claim feature. Firstly, the "grading" is achieved in the specification by deliberately manipulating the filler matrix ratios. Secondly, the claim requires the grading to be present "over the extent of a liner". These aspects of the "grading"

feature differentiates claim 34 from the examiner's allegations regarding the teachings of Collins because the grading feature is clearly a macro scale feature and not a micro scale variance as the examiner alleges Collins inherently discloses. For this reason, therefore, claim 34 is novel over Collins and nonobvious over the prior art cited in the Final Rejection.

#### **V. CLAIM REJOINDER REQUEST**

Should claim 1 be found to be patentable, then Applicant requests rejoinder of claims 15-16, 19-23 and 25-28.

#### **CONCLUSION**

All pending application claims are believed to be ready for patenting for at least the reasons recited above. Favorable reconsideration and allowance of all pending application claims is, therefore, courteously solicited.

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